

For

William Allen Esq. F.R.S.

as a small testimony
of gratitude and friendship

This Treatise

is presented

By

The Author.

A

TREATISE

ON THE

MINERAL WATERS

OF

GILSLAND,

BY

W. REID CLANNY, M. D.—M. R. I. A.

HONORARY MEMBER OF THE ROYAL PHYSICAL
SOCIETY OF EDINBURGH, AND OF THE
KIRWANIAN SOCIETY OF DUBLIN,
ETC.

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TREATISE
ON THE
MINERAL WATERS

GILSLAND

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SOCIETY OF LONDON, AND OF THE
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1874

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TO

THOMAS THOMSON, M. D.

F. R. S. L. AND E. F. L. S.

ETC. ETC. ETC.

THIS TREATISE

IS MOST RESPECTFULLY DEDICATED

BY HIS SINCERE FRIEND,

THE AUTHOR.

TREATISE,

&c.

THE sulphureted mineral water of Gilsland obtained for itself a lasting reputation, when the science of Medicine was in its infancy, in these islands; and Chemistry, the legitimate sister of Medicine, proves that this good name was not improperly applied. The writer considers it his duty to express unreservedly his unbiassed opinion of the sulphureted and chalybeate mineral waters of Gilsland; and accordingly his first care shall be, to give some particulars relative to the place, by way of introduction; secondly, a chemical investigation of the waters; and, thirdly, their medical effects, from what has fallen

under his own inspection, and also from analogy.

The writer visited this very respectable watering place two different seasons, which afforded him an opportunity of examining the waters, with the attention they merited; and from their general appearances, as well as from the very favourable reports of several intelligent individuals, he could not but consider them as deserving every attention on his part, as a professional man. These impressions, and the recent discovery of the above-mentioned valuable chalybeate in the immediate vicinity of the sulphureted spaw, which had not been analyzed, fixed his determination to attempt the analysis of these waters, though from experience, he was well aware of the time and exertions requisite for such an undertaking.

The sulphureted spaw of Gilsland has been resorted to by invalids, "time out of

mind." It springs into day upon the right or western bank of the river Irthing, in the barony of Gilsland, Cumberlandshire, from which it derives its name. It was anciently denominated, "the holy well," no doubt from its medical effects; and more recently it was called "Wardrew spaw," from the mansion house upon the opposite bank of the Irthing, in the county of Northumberland, for at this place the Irthing forms the boundary of the two counties. It is remarkable that the only title of nobility ever conferred by Oliver Cromwell was that of Baron Gilsland, and Viscount Morpeth, upon Charles Howard, a descendant of Thomas the fourth Duke of Norfolk; which grant was confirmed to him by Charles the Second, by the title of Baron Dacres of Gilsland, Viscount Howard of Morpeth, and Earl of Carlisle, from whom the present noble Earl is descended.

Gilsland has been a watering place of fashionable resort for upwards of seventy

years, people of rank and fortune from Ireland and Scotland, as well as from different parts of England, having annually derived health and amusement by visiting this favoured spot. These mineral waters are eighteen miles east from Carlisle, and about two miles north of the great road leading from that city to Newcastle.

The air of this place, compared to that of most parts in the north of England, is very salubrious; and no small benefit is derived by the invalid from its purity and high range of temperature.

The distant view of Gilsland is not very inviting, for the heath-clad hills in its immediate vicinity appear wild and uncultivated; but this unfavourable impression vanishes, the moment we arrive upon the spot.

The romantic walks round the Shaws are of considerable importance to the in-

valid. It is rather singular that the real meaning of the word, "Shaws", has not hitherto been given by those authors who have attempted it. In the north of England, and in most parts of Scotland, this word is familiar, signifying, as in the original Saxon, a wood or any vegetable production; and this meaning is, even in our time, very applicable, from the woods round the Shaws, both cultivated and natural.

From the Shaws Hotel, but more particularly from Wardrew hill, very extensive views in the counties of Cumberland and Northumberland are presented. Amongst these, the majestic Skiddaw and Saddleback are most conspicuous.

The sweeping declivities of the former august mountain nearly reach the margin of Bassenthwaite Lake, above the level of which its summit rises upwards of three thousand five hundred feet in perpendicu-

lar height, according to experiments made with the barometer.

“ There tow’ring Skiddaw, wrapt in awful shade,
Monarch of mountains, rears his mighty head ;
Dark’ning with frowns fair Keswick’s beauteous vale,
He views beneath the gathering tempests sail.”*

At the Shaws Hotel there is a good library, which, for a small acknowledgment, is open to the visitors. It contains a selection of very appropriate and amusing books. Drinking the waters, walking, riding, conversation, reading, music, billiards, and dancing, leave no room for *ennui*. The society at this Hotel reminds one of an extensive family circle.

Gilsland is famed for trout fishing in the Irthing ; and about four miles eastward there are several lakes, which, being well stocked with pike and perch, yield an amusing and useful recreation to the visitors ; and the neighbouring moors

* Maurice.

afford sufficient scope for an extensive range in the shooting season, to such as are sanguine in the sports of the field.

The comfort and convenience of the visitors at Gilsland are attentively considered. There are commodious hot and cold baths for those who may require the sulphureted water as an external application. The Shaws Hotel, Wardrew-house, and the Orchard-house, are upon the same plan as the Hotels at Harrowgate, but not so expensive. There are also two very neat lodging houses; and this year, (1815) Major Mounsey, the proprietor of Gilsland, is building a cottage near the Shaws, for his summer residence.

The amusing studies of Mineralogy, of Botany, and Antiquities, may be advantageously pursued at Gilsland; few watering places affording such facilities for the acquirement of practical knowledge in those subjects.

Scarcely two miles west of the Shaws, upon the bank of the Irthing, there is a curious petrifying spring. The fantastic depositions of carbonate of lime upon birds' nests, &c. will sufficiently reward the visitor who may not have had an opportunity of examining any thing of this description; and about two miles north of Gilsland spaw, the Irthing is precipitated over lofty rocks, and forms a cascade of singular beauty.

The celebrated Roman wall, which intersects the kingdom, passes at the distance of a mile to the south of Gilsland. It is also called, though very improperly, "the Piks' wall"; but it should be held in remembrance, that this wall was built at least two hundred years before the Pikish period, and that it was the Emperor Hadrian who raised the dike or rampart, about the year 120 of the Christian era, which extended from Wall's End, near the mouth of the Tyne, to Boulness upon the

Solway frith in Cumberland. And about the year 207 of the same era, the Emperor Severus built a wall of cut stone, parallel with, and to the south of Hadrian's rampart.

The writer visited several remains of "the wall", which forcibly reminded him of the great military power and consequence of the ancient Romans. Many perfect altars, coins, and other antiquities have been found amongst its ruins, of which Mr. William Bell, of Wardrew House, has made an extensive, and well-arranged collection.

At Caervoran, near Glenwhelt, the highest remaining part of the wall may be seen, where it runs upon the brink of a cliff to the summit of an eminence ; and from the Orchard House to Burdoswald, (the Amboglanna of the Romans,) remains of the wall, and also of the rampart, may be traced for nearly two miles. Burdos-

wald is the first Roman station of any consequence upon the wall in Cumberland, and is about two miles west of Gilsland spaw. The site of this station is bold and commanding. The plain upon which it stands terminates in a very deep descent towards the river Irthing, which flows near the south side of the wall for several miles. This Castrum forms a parallelogram of one hundred and twenty yards north and south, by eighty yards east and west; and its area includes about two acres. All its sides have been fortified with walls, of which that of Severus was on the north: the others were simple aggestions of stone uncemented with mortar. The foundations of gateways, and the ruins of buildings are still visible all over the station, as well as the site of the *prætorium*, though almost covered with modern buildings. Strangers who may be inclined to visit this very beautiful station, should be careful to procure permission from the *Cerberus*, who now guards

the *prætorium*, lest they meet a decided exclusion. Several Roman altars have been found at this station, some of which may be seen at the Shaws Hotel, by which it appears that it was garrisoned by the *Cohors prima Ælia Dacorum*.

About a mile west of Burdoswald are the ruins of the ancient castle of Triermaine, the baronial residence of the Lords of Triermaine. This place has lately been celebrated in a pleasing poem, after the manner of Walter Scott, entitled, "The Bridal of Triermaine." The following epitaph was formerly in Lanercost church.

"Sir Rowland Vaux, that sometime was the Lord of
Triermaine,

Is dead, his body clad in lead, and ligs law under this
stane ;

Evin as we, evin so was he, on earth a levan man,

Evin as he, evin so maun we, for all the craft we can."

Five miles further west from Burdoswald, and about seven miles from the

Shaws, are the romantic ruins of Lanercost priory, an Augustine monastery, founded by Robert de Vaux, or de Vallibus. The Earl of Carlisle, being descended in the female line from the Lords of Triermaine and of Dacre, is now the proprietor of Lanercost priory, and also patron of the church, which was certified to the governors of Queen Ann's bounty at fourteen pounds five shillings, but it has since received an allotment of two hundred pounds. Many liberal donations were made to this monastery, and some of them exhibit the peculiar character of the times, such as the tithes of venison, and skins of deer, and foxes, tithe of the mulcture of a mill, pasture for milking and sheep, the bark of trees, a well or spring, and sundry villains their issue and goods. The remains of this venerable structure still excite the attention of the traveller, and the investigation of the antiquary.

The ruins of Lanercost priory are situated in an extensive vale, between the Irthing and the Roman wall. The eye reposes with placid delight upon the tender and elegant beauties of a picturesque landscape, whose softened and quiet features seem to lull every worldly care to rest, and to open the heart and mind to the admission of solemn, pensive, and endearing images.

The church is built in the form of a cross, and the gate-way consists of a circular arch of many members, richly ornamented and supported on pilasters, the capitals and bases of which are without any other embellishment than plain rolls. Here is a statue of Mary Magdalen, (to whom this church was dedicated,) in a niche, above the entrance, which is of excellent workmanship. The drapery is very elegantly disposed, and on her right there is a *petit* figure of a monk in a kneeling attitude. This part of the priory has

lately been fitted up as a parochial church, but all the other parts of the building are open and exposed to the weather, exhibiting massive, but finely proportioned gothic pillars, and delicately carved lancet, and gothic arched windows, over which the ivy and other parasitic plants and shrubs are most profusely but beautifully interwoven. The interior of this majestic ruin bears a striking resemblance to the chancel of the cathedral church of Durham, and perhaps the same plan for this part of the building served for both structures, as they were built about the same period.

Within the walls of the priory are several monuments of the founder and his noble descendants, the Dacres and the Howards, upon which their richly sculptured coats of arms are still visible. The centre tower, which is embattled, and the outer walls remain nearly entire, though unroofed. The gate of the burial ground is a fine semi-circular arch, which is en-

tirely covered with ivy. It would occupy many pages to give a complete description of these enchanting ruins ; and the writer having visited them without a guide, which was hardly to be expected at the place, he has been the more communicative, in order to supply that deficiency to those who may hereafter visit them.

From Lanercost priory the battlements and towers of Naworth castle are seen through the ancient oaks of Naworth park. This castle was the baronial residence of the Lords of Gilsland. It has been truly remarked, “ that the vast and solid mansions of our ancient nobility were like their characters ; possessing greatness without elegance, strength without refinement ; but lofty, firm, and commanding.” The antiquity, the strength, and the perfect state of Naworth castle, in all its appendages and furniture, claim a high distinction for it amongst baronial edifices.

The castle is built upon a pleasant eminence. It chiefly consists of two large square towers, united by other buildings, and inclosing a quadrangular court. The arms over the entrance, which is upon the south, are those of the Howards and Dacres quarterly, having griffins for supporters, the crest, a bull collared, with the motto, "FORT EN LOIALTE." There is no portcullis.

We are told that this castle was built by the Dacres, whose original mansion was Dacre castle in this county, which is even a more ancient structure than this. There is no certain information as to the period of its erection, and the first mention of it occurs in the reign of Edward the Second. Upon any future visitor's arrival at this castle, he may expect to be politely conducted through it by an attentive and intelligent person. This circumstance supersedes the necessity of a more minute description.

It may, however, be mentioned, that this edifice is completely furnished with the same furniture, and carefully kept in the same state, as when Lord William Howard, warden of the western marches, made it his residence. The library, which is stored with black-letter books; the chapel; the banqueting hall; the gallery, with the armour it contains; and Lord William's own apartments, which are secluded at the top of the western tower, and communicate with the dungeons, are exceedingly interesting objects.

The structure and whole interior arrangement operate very forcibly in recalling ideas of feudal oppression and manners. The old windows are narrow and grated; the doors cased with iron, moving on ponderous hinges, and guarded with massive bolts. The chambers are dark and hung with gloomy furniture, and the approaches intricate, and without regularity. The mantle-pieces are sculp-

tured with coats of arms; many of the ceilings figured, and the mouldings of several apartments gilt and painted.

The firm and wise government of Lord William Howard produced a wonderful change in the lawless manners of the surrounding country, and introduced a degree of security, where every thing before had been violence and licentiousness.

Lord William is frequently the hero of border minstrelsy, under the familiar appellation of "Belted Will Howard," and "Bauld Willey". We read the following in the poetical works of a descendant of border chieftains.

"Thus to the ladye did Tinlinn shew
The tidings of the English foe—
"Belted Will Howard is marching here,
And hot Lord Dacre with many a spear."——

Mr. Walter Scott, in his beautiful poem, "the Lay of the last Minstrel", has intro-

duced several very pleasing and interesting border scenes, and has used the same epithets, when speaking of Lord William Howard, that former border minstrels had given to his lordship.

In Fuller's Worthies of England we have a good description of the moss troopers. Amongst other sensible observations he remarks that, "When in their greatest height, they had two great enemies, the laws of the land, and the Lord William Howard of Naworth." Undoubtedly such a lawless banditti required the most severe measures on the part of the lord warden : nevertheless, it must not be denied, that arbitrary power carries something truly horrible in its front, even in the worst of times, and too frequently verifies the trite adage,

"Summum jus summa injuria."

This castle is one of the seats of the Earl of Carlisle, whose classic taste is

eminently displayed in maintaining this curious and venerable pile in its ancient state.

At the distance of five miles across the moor from the Shaws, in a wild and uncultivated district, the town of Bewcastle is situated. This place is supposed to have been a Roman station, and in former times it had a baronial castle. Bewcastle is often visited on account of a curious and richly sculptured cross, (or obelisk, as it has been called since the top fell off,) which is placed in the church yard. Upon this cross are the remains of several ancient figures in bass-relief, and two Runic inscriptions, which have not been translated. Several wood cuts representing this cross, and its Runic inscriptions, may be seen in the Gentleman's Magazine for the year 1742, at pp. 132, 318, 369, and 529. Bishop Nicholson has given a diffuse, but by no means luminous account of this cross in the Philosophical Transactions.

Thirlwall castle is about two miles east of Gilsland. This appears to be a very strongly built and ancient castle. The walls are so firmly knit together, that they resist the iron hand of time, in an astonishing manner, though it has been unroofed for many years. It is seated upon the edge of a rock, above the brook Tippal, and has been such a dark and melancholy fortress, that with propriety it might have been called the strong-hold, rather than the seat of the Thirlwalls. Some of the walls are nine feet thick, which appear as firm as a rock ; though in many places the ashlar stones, which appear of Roman origin, are removed for the purpose of building the neighbouring tenements. The floor of one of the apartments consists of three tiers of flags, having intermediate strata of sand. The windows are no larger than loop-holes. The extent of the building is twenty yards in length, and twelve in breadth, and it has been turretted. Eleanora, the last of

the Thirlwall family, sold this castle and its demesnes to the Earl of Carlisle.

Two miles eastward, and about four from Gilsland, are the remains of Blenkinsop castle, which is the property, and has been in the family of Colonel Blenkinsop-Coulson for many centuries. This castle is situated upon an eminence on the south bank of the Tippal, and consisted of a square tower, built on an artificial mount. At the distance of four paces it was surrounded by an outward wall, of an equal height with the interior building. Here was formerly an altar, inscribed, "*Dcabus Nymphis Vetia mansueta, et Claudia Turbivella filia votum solverunt libentes.*" Who these nymphs were, it is now very difficult to determine.

About six miles south of Gilsland, in a sequestered *haugh* or valley, stands Featherstone castle, now the residence of the Right Honourable T. Wallace; and

formerly the seat of the Featherstonehaughs, a very ancient and powerful family. This castle is little more than a square tower, with a battlement and two exploratory turrets, and is vaulted underneath, for the purpose of securing animals of different descriptions, in the time of an assault. About ten miles further to the south, through the beautiful vale of Knaresdale, Alston-Moor is situated, famed for its lead mines, and deserving the attention of those who may be able to accomplish such a pleasant journey from Gilsland. The inns at Alston are excellent, and offer good accommodations to such ladies as may not like to ride thirty-two miles, on horseback, in one day.

At Mumps-Hall, about a mile from the Shaws, are two conical hills, one of which has a level communication to the ditch of the Roman wall, at a place called the Crooks. Formerly, upon the summit of this hill stood a large slab of red sand-

stone, with the figure of Victory in bass-relief, very neatly sculptured upon it, which may now be seen at the Shaws. These two hills appear to be artificial, and not unlike Danish raths or mounts. They are both in the county of Northumberland. The rivulet Powtross skirts them, and the road from Glenwhelt to Gilsland passes between them.

The town of Brampton, about eleven miles distant from the Shaws, is chiefly remarkable for its antiquity, and a lofty conical mount, called the moat, or castle-hill, which is situated at the east end of the town. The acclivity of this mount is considerable, and its height is about three hundred feet perpendicular. Near the summit is a ditch and rampart, which entirely surround the hill, the crown of which has been formed into a plain, about forty paces in diameter, and defended by a breastwork. The view from the summit is very extensive and pleasing.

About two miles from Brampton is the celebrated Roman inscription, on the face of a rock overhanging the river Gelt. The rock, upon which it is cut, is of an angular form: from its exposed situation the letters have been partially obliterated by the weather, but still less so than might have been expected; as it may be ascertained by the inscription itself, that it has endured the storms of more than fifteen centuries. The shape of the characters, and arrangement of the lines, require an engraving to represent them properly; but the mode in which it is generally read, and which seems to be the true one, is as follows.

IX X

VEXL LEG II AVG OB APP

SVB AGRICOLA OPTIO

APRO E MAXIMO

CONSVLIBVS

OFICINI MERCATI

MERCATIVS FERMI.

This, Mr. Horsley explained in the following manner. *Vexillatio Legionis secundæ Augustæ, ob virtutem appellatæ, sub Agricola optione Apro et Maximo Consulibus ex officina Mercatii Mercatius filius Fermii.*

These are only a few of the more interesting objects in the immediate vicinity of Gilsland spaw ; but others of equal, if not of greater importance, present themselves, as the rides are extended, independently of the Lakes, for which Cumberland is famed.

Upon the top of the bank, at the Shaws-Hotel, there is a broad terrace walk, from which we have a pleasing view of cultivated scenery upon the opposite bank of the Irthing, including Wardrew house. At the upper end of this walk, immediately above the sulphureted spaw, the whole dell below opens at once to the view, unfolding grand scenes of picturesque beauty, to which Art has judiciously con-

tributed her assistance. Walks on each side of the river are seen at several places, through the variegated woods, having benches at proper distances. Upon leaving the Shaws-Hotel for the sulphureted spaw, we descend by a steep gravel walk to the river, where the eye is charmed by a finely wooded amphitheatre of stratified rocks, which give an impressive air of grandeur to this favoured spot.

THE SULPHURETED WATER.

It is requisite that a description of the strata, perpendicularly surmounting the sulphureted spaw, be given, though the attempt is attended by obstacles, on account of their great height and difficulty of access. Several erroneous accounts of the depth and composition of these strata having been published, the writer resolved to put the matter beyond conjecture; and for this purpose he procured a strong line and plummet, and being accompanied by a spirited and active young man from the neighbourhood, they fixed themselves upon the small tree, which hangs over the sulphureted water; and having placed a person upon the opposite bank of the river, to hail, as the plummet approached the commencement and termination of each stratum, they were enabled, in

that perilous situation, to note down, very accurately, the depth of each stratum.

Upon the top of the bank, and due west from the sulphureted spaw, there is a field, the soil of which appears to be alluvial, and is of a soft, dark, and decomposing nature: through this field the sulphureted water, most probably, percolates.

The strata are disposed in the following manner. Surface soil, one foot. Irregularly stratified sandstone,* thirty-three feet five inches. Bituminous shale, twenty-two feet nine inches, which includes a stratum of aluminous shistus, four feet two inches in depth. Porphyry slate, containing minute crystals of felspar, and iron pyrites, twenty-two feet

* The third sandstone of Werner. Vide Dr. Thomson's System of Chemistry, fourth edit. vol IV. p. 562.

ten inches. From under this stratum the sulphureted water springs into day, through a leaden tube, at the rate of two gallons and a half per minute. Below the spaw are the following strata. Bituminous shale, four feet, through which run four thin strata of clay ironstone. Coarse greenstone, two feet. Bituminous shale, containing eight thin strata of clay ironstone, six feet; and cubical coal, nine inches. From the above it may be observed, that the depth from the surface to the river Irthing is exactly ninety-two feet nine inches.

These strata are intersected by two veins, one upon each side of the sulphureted water, which, commencing at the surface, approximate pretty uniformly till they reach the river, at which place they are about one hundred and fifty yards distant. These veins are composed of calcareous spar and iron pyrites, and con-

tain the above-mentioned strata between them.

From a general view of the alluvial field, and the formation of the bank, the mind is strongly biassed in favour of the uniformity and permanency of this mineral water.

This water is remarkably transparent. When poured from one tumbler into another, it sparkles very briskly. To most palates the taste is very agreeable, being somewhat acidulous, and it has generally been found to sit light upon the stomach. The smell is so strongly sulphureous, as to extend to the distance of fifty yards. The temperature of this water, at 29 barometrical pressure, was 42°. Fahr. In the river Irthing, the mercury was raised to 50°. whilst in the shade it stood at 60°, and the specific gravity of the sulphureted water, at the above-mentioned temperature of the atmosphere, was 1,00037. This water does not deposit a sediment.

EXAMINATION BY REAGENTS.

A. Tincture of litmus was sensibly reddened from the fresh, but not from the boiled sulphureted water.

B. Polished silver immersed, was rendered dark brown upon the surface.

C. Bismuth suspended over the spring, for six hours, became tarnished.

D. Paper stained with nitrate of mercury, when immersed in the water, became black in the course of an hour.

E. Super-acetate of lead caused a copious clay-coloured cloud, which soon afterwards became black : with the boiled water a white cloud was formed.

F. Nitrate of lead produced a dark cloud.

G. Characters written upon a card with super-acetate of lead, and laid upon a tumbler of the water, became dark brown in a few minutes.

H. Acetate of silver caused a considerable cloud.

I. Succinate of soda produced a very slight white cloud upon the surface, but sent down no precipitate.

J. Triple prussiate of potash, gallic acid, tincture of galls, and succinate of ammonia, were separately employed as tests, and none of them produced any effect, either upon the fresh water, nor after it had been concentrated by evaporation.

K. A piece of nutgall, suspended for eight days in the water, produced no change.

L. Lime water afforded a slight cloud.

M. Crystallized hydrate of barytes sent down a white precipitate.

N. Hydrate of strontia produced no change.

O. Muriate of barytes occasioned a very slight blue tinge, which was scarcely perceptible.

P. Barytes water occasioned a white cloud.

Q. Oxalic acid, with the fresh water, exhibited a white cloud: with the boiled water there was no change at first, but a cloud was soon afterwards formed.

R. Oxalate of ammonia caused a white cloud, both with the fresh and the boiled water.

S. Fluete of ammonia occasioned a diaphanous cloud, with the fresh and likewise with the boiled water.

T. Pure ammonia produced no evident change.

U. Carbonate of ammonia rendered the water dim.

V. The sulphuric acid, and also nitrous acid, caused a copious disengagement of air bubbles, when added to the fresh water; and the same acids, when mixed with water highly concentrated, occasioned the developement of a sulphureous odour.

W. Chlorine, or oxymuriatic gas, rendered the water turbid and yellowish.

X. Nitrate of silver, when added to the fresh water, formed a considerable, black precipitate; and with the boiled water an abundant white precipitate was thrown down.

From the above examination by reagents, the writer was led to expect sulphureted hydrogen gas, and carbonic acid gas, in this mineral water: and in order to ascertain their respective properties in a given bulk of water, 924 cubic inches of the fresh sulphureted water were put into a jar, to which Woulf's apparatus was attached in the usual manner.

The first of the three-necked bottles of the apparatus was filled with a solution of super-acetate of lead; to which acetic acid was added, to render the solution acidulous. The second three-necked bottle contained lime water. Upon the application of heat to the water in the jar, precipitates were deposited in both the bottles. The solution of super-acetate of lead became black, and the lime water in the second bottle became milky. By this method, the sulphureted hydrogen gas was caused to combine with the oxide of lead; and the carbonic acid passed through

the solution of super-acetate of lead unaltered, (being prevented from forming a carbonate of lead by reason of the excess of acetic acid,) and accordingly united with the dissolved lime in the second bottle of Woulf's apparatus.

From this process a hydro-sulphuret of lead was formed in the first, and a carbonate of lime in the second bottle. From 924 cubic inches of the sulphureted mineral water, treated in this way, 129.2 grains of hydro-sulphuret of lead were produced; which, according to M. Westrumb, are equal to 17 cubic inches of sulphureted hydrogen gas: and the carbonate of lime obtained from 231 cubic inches of this mineral water, calculated in the usual manner, indicated 6.2 cubic inches of carbonic acid gas. One gallon of the sulphureted water therefore contains

	Cubic inches.
Sulphureted hydrogen gas.....	17.0
Carbonic acid gas.....	6.2
	<hr/> 23.2

ANALYSIS.

Ten thousand grains of the sulphureted water being very carefully evaporated upon the spot, left a residue, which, when dried over a lamp, weighed 4·65 grains. Its taste was saline and alkaline, and it changed turmeric paper to brown, thereby indicating that it contained an alkali.

Distilled water dissolved 4·2 grains of it. The writer could find nothing in this solution but common salt and carbonate of soda: he divided the solution into two equal portions. One was neutralized by acetic acid, and then precipitated by nitrate of silver. The precipitate weighed 4·3 grains, which indicates, in the whole solution, 3·43 grains of common salt. The other portion was very carefully neutralized by the writer's test sulphuric acid, of which 30 grains were requisite. This indicates 0·77 grain of carbonate of soda, in the whole solution. That it was car-

bonate, and not pure soda, was evident from the effervescence. No doubt, in the water, the soda is combined with sulphureted hydrogen. The undissolved portion weighed 0.45 grain : of this, 0.25 dissolved, with effervescence, in muriatic acid, and was precipitated by oxalate of ammonia. It was therefore carbonate of lime. The remaining 0.2 grain dissolved in no acid, but fused into a glass with potash, and was therefore silica. Hence the residue was composed as follows,

	Grains.
Common salt.....	3.43
Carbonate of soda.....	0.77
Carbonate of lime.....	0.25
Silica	0.20
	<hr/>
	4.65

The following are the gaseous and solid contents of a wine gallon of this water.

	Grains.
Sulphureted hydrogen gas...	17.0
Carbonic acid gas	6.2
	<hr/>
	23.2

	Grains.
Common salt	20.05864
Carbonate of soda	4.50296
Carbonate of lime	1.462
Silica	1.1696
	<hr/>
	27.19320 *

It is worthy of remark, that an interesting controversy has lately been carried on, in Germany, respecting the existence of sulphureted azotic gas in the mineral waters of Aix-la-Chapelle. It was first announced by M. Gimbernath, as forming a constituent of these mineral waters. Then appeared their analysis by Dr. Reaumont, and by M. M. Monheim and Lausberg. The experiments of M. Westrumb

* The late Dr. Garnett, not long before his decease in 1802, gave some account (for analysis it could not be called,) of the Gilsland sulphureted water. It is the opinion of the writer, that more attention should have been bestowed upon it; but perhaps the Doctor's visit was too short to enable him to enter more fully upon the subject.

followed; and likewise the attempts of Professor Berzelius and M. Hedenberg to form sulphureted azotic gas artificially, which were not attended with success. M. Monheim, after reconsidering the subject, and performing several decisive experiments, retracts and explains in the following words. “ Dans cette circonstance il se depose, constamment du soufre, et il parait hors de doute que dans les eaux minerales d’ Aix-la-Chapelle, le soufre est uniquement combine avec l’hydrogene, et que si le gaz hydrogene sulfure n’est pas decompose par l’acide nitreux ou par l’acide sulfureux, il faut attribuer le phenomene a la grande quantite de gaz azote avec lequel il est mele.”*

* Annales de Chimie. 1812.

THE CHALYBEATE WELL.



This mineral water has been discovered about four years. Its situation could not be more convenient, for it is only a few yards north of the sulphureted water, upon the verge of an extensive tract of uncultivated land, at that point where the river Irthing alters its course to the south, and thereby changing the scene, opens a pleasing view of its rocky and wooded banks, to the north-east.

The following are the strata, as they appeared to the writer, at his last visit to this place. Surface soil, from two to four feet. Coarse sandstone, cemented by an argillaceous basis, from which the chalybeate water issues, three feet. Below this there is a stratum of coarse sandstone, in cubical masses, at least four

feet; the lower part of which cannot be traced further, as it is covered with gravel and pieces of sandstone.

Upon repeatedly pouring this chalybeate from one tumbler into another, it became turbid. The same effect followed when the water was briskly agitated in a phial; but when it was permitted to rest for a short time, an orange-coloured precipitate was deposited. The taste is acidulous and strongly ferruginous. The temperature of the water, as it stood exposed to the sun, was 50° . and, at the same time, the water of the rivulet indicated exactly the same degree of heat. The temperature of the atmosphere was 60° . and barometrical pressure $28\frac{1}{2}$. The specific gravity of the water was 1.00078. This chalybeate generally flows at the rate of a gallon in fifteen minutes; but from its being near the surface, the quantity is in some degree influenced by the state of the weather; which is not the case with the sulphureted water.

EXAMINATION BY REAGENTS.

A. Litmus paper was reddened by this water.

B. Paper stained with brazil wood was changed to purple.

C. Sulphuric acid produced no change.

D. Oxalic acid gave a bright yellow, without either cloud or precipitation.

E. Three drops of oxalate of ammonia rendered the water yellow ; the addition of five more threw down a white precipitate.

F. Triple prussiate of potash gave a beautiful blue.

G. Tincture of galls a fine black.

H. A piece of nutgall was immediately enveloped in a purple cloud, which afterwards became black.

I. Five drops of gallic acid threw down a dark blue precipitate.

J. Fluete of ammonia threw down a white flocculent cloud, which was scarcely perceptible.

K. Pure ammonia formed a yellow flocculent cloud.

L. Nitrate of silver a white cloud.

M. Muriate of barytes a considerable white precipitate.

N. Barytes water occasioned a dense, whitish cloud, which fell to the bottom in the form of a precipitate.

This chalybeate oozes from the rocks, as mentioned above, and, dropping several feet into a shallow uninclosed reservoir, is not in a fit state to undergo an examination for its gaseous contents. The writer will therefore proceed to detail the experiments which were performed, in order to ascertain its solid contents.

ANALYSIS.

From ten thousand grains of this water 19·6 grains of residuum were obtained by evaporation, which had a dull yellow colour. This residuum, when exposed to the heat of a lamp, became dark grey, and was reduced to 13·6 grains. Water dissolved 9·2 grains of this residuum. The portion dissolved, as far as the writer could determine by experiment, consisted entirely of sulphate of iron. The 4·4 grains of insoluble matter being treated with muriatic acid, 1·3 grain of sulphate of lime was obtained. The muriatic solution be-

ing evaporated nearly to dryness, to get rid of the excess of acid, oxalate of ammonia was dropt in, but no precipitate fell: therefore no lime was present. Ammonia threw down a precipitate, weighing 0·4 grain, one half of which dissolved at once in dilute sulphuric acid, and therefore was magnesia. The other half being fused with potash became glass, and was therefore silica. On examining the solution, which had been precipitated by ammonia, the rest of the magnesia was found in it which was wanting to complete the sum total. So that the residue was composed as follows.

	Grains.
Sulphate of iron	9·2
Sulphate of lime	1·3
Carbonate of magnesia	2·9
Silica	0·2
	<hr/>
	13·6

The magnesia was doubtless held in solution by carbonic acid. In the residue

it exists in the state of subcarbonate. Conformably with the above results, the following are the solid contents of a wine gallon of this chalybeate water.

	Grains.
Sulphate of iron	53·8116
Sulphate of lime	7·6024
Carbonate of magnesia....	16·9592
Silica	1·1696
	<hr/>
	79·5428

An idea has long been impressed upon the mind of the writer, that the solid contents of mineral waters are in a different state of combination when suspended in the water, from what they are found to be when disengaged from it by evaporation. This subject is ably treated, for the first time, by Dr. John Murray, in his analysis of the mineral waters of Dumblane, inserted in the seventh volume of the Transactions of the Royal Society of Edinburgh, just published.

It now remains to give some account of the physical qualities and medical virtues of these mineral waters ; and the sulphureted hydrogen gas, as it stands in the preceding analysis, first claims our attention. This gas, when exposed to the atmospheric air, may be ignited by a lighted taper, and burns with a pale blue flame, depositing sulphur. It is absorbable by water, which takes up more than an equal volume of it. The specific gravity of this gas, according to M. M. Gay Lussac and Thenard, is to that of air as 1.1912 to 1. Its weight to that of hydrogen may be considered as 16 to 1. And 100 cubical inches of it, at a mean temperature and pressure, weigh between 36 and 37 grains. It consists of two proportions of hydrogen 2, and 1 of sulphur 30. This curious gas is possessed of the properties of an acid, enters into combination with the alkalies, and forms compounds, some of which are crystallizable.

Super-acetate of lead, (or sugar of lead, as it is vulgarly called,) when dissolved in common water, may, with the agency of the sulphureted water, be used as a sympathetic ink, in the following manner. Characters written with this solution, and placed over a tumbler of the water when fresh drawn, will become nearly black in a few seconds. This pleasing experiment will afford an innocent recreation in many different ways, which need not be pointed out to the ingenious or accomplished visitor.

Several anecdotes are circulated, concerning ladies who have inconsiderately bathed in sulphureted waters, after they had used white paint, which being in most instances a chemical preparation of lead, immediately becomes black upon the skin by the application of the sulphureted water.

It is a fact well known to professional men, that the use of white paint always

injures the health, and ultimately thickens and shrivels the skin.

For the detection of lead in water, the most delicate test is a sulphureted water, such as that of Gilsland. To the suspected water add half its volume of the sulphureted water, and if lead be present it will give the suspected water a dark brown or blackish tinge.

Observing the good effects of different descriptions of mineral waters in several chronic diseases, medical men are justly authorized in concluding, that however small the proportion of gaseous or solid contents may be, their active medical properties must in a great measure be attributed to the state of dilution, in which they are held, by which they are permitted to pervade the system. A more instructive example of this cannot be adduced than that of the sulphureted mineral water of Gilsland. The writer attended, profes-

sionally, several persons, who, during a course of this mineral water, were sensible of the transmission of the well known odour of sulphur through the pores of the skin, which prevailed to such an extent in some cases, as to tarnish the silver which they carried in their pockets.

From this it will be readily inferred, that sulphureted waters are very powerful and active remedies ; as the sulphur, in the attenuated form which it assumes in its combination with hydrogene gas, is conveyed through the smallest vessels. To what extent the solid contents of this water are carried through the system by the same agency, the writer is not prepared to say.

The carbonic acid gas, which is likewise a component part of this mineral water, next demands our attention. This gas extinguishes flame, and is not respirable by animals. It is noxious to fishes and insects.

The mean of a number of experiments, by Messrs. Allen and Pepys, gave the following statement of the composition of this gas in one hundred parts by weight, 28.60 carbon, and 71.41 oxygene. It is heavier than atmospheric air, the above-mentioned philosophers having lately determined that 100 cubic inches of this gas, at 60°. Fahr. and 30 inches barometer, weigh 47.26 grains. Mr. Kirwan found an equal volume of atmospheric air, under the same temperature and pressure, to be 30.92 grains. Carbonic acid gas is absorbable by water; and, according to Dr. Henry's experiments, this fluid, under common circumstances, takes up an equal bulk of carbonic acid; under the pressure of two atmospheres, it will absorb twice its bulk; under three atmospheres, three times its bulk; and so on.

All animals in respiring atmospheric air give out carbonic acid from the lungs. It is curious that when water is saturated

with carbonic acid, and applied to the roots of plants, it proves highly nutritive; the carbonic acid is, in this case, decomposed, its carbon forming a component part of the vegetable, and its oxygene is liberated in a gaseous form. On the contrary, carbonic acid applied as an atmosphere, by confining a living vegetable in the undiluted gas over water, is injurious to the health of the plant, especially in the shade.

Most probably the chief action of carbonic acid gas is confined to the stomach, which it strengthens considerably, particularly when it is in such quantity as to distend that viscus. It cannot however be doubted, that part of this gas is absorbed into the circulating system, along with the water that conveys it into the stomach.

In treating of the medical effects of mineral waters, much attention is requisite,

so as to avoid extremes. If the ideas of the author be conveyed in technical language, the general reader will reap little information; and should he adopt a familiar stile, he runs a chance of being classed with some modern, *popular*, medical writers, whose motives are too well known to require any elucidation in a work of this nature. He must avoid abstruseness and self-sufficiency; for as Medicine is a conjectural art, it is not too much to say, that generally speaking, the more knowledge and experience we obtain in our professional pursuits, the more moderate and diffident we become in anticipating favourable results from our practice in dangerous diseases.

In Dr. Heberden's Commentaries we have the following remark. "The art of healing therefore has scarcely hitherto had any guide but the slow one of experience, and has yet made no illustrious advances by the help of reason; nor will it probably

make any, till Providence think fit to bless mankind by sending into the world some superior genius, capable of contemplating the animated world with the sagacity shewn by Newton in the inanimate, and of discovering that great principle of life, upon which its existence depends, and by which all its functions are governed and directed.”

This is rather gloomy, but let us not despair; for it is gratifying to reflect, that during the last twenty years, a more rational method of cure has been adopted in most diseases; and the brilliant discovery of vaccination by Dr. Jenner, affords to the world a convincing proof of the rapid progress of medical science in our day.

A *perfect* chemical knowledge of the solids and fluids which enter into the composition of the human body must pave the way for a more successful prac-

tice; and it is well known, that there are some diseases which cannot be thoroughly understood, except we possess a competent knowledge of practical chemistry.

The value of Chemistry to the profession requires a few observations, which are chiefly intended, by the writer, for the perusal of such persons as may yet have an opportunity of cultivating this fascinating and most useful science.

Professional men should be careful that their prescriptions be founded upon sound chemical principles; for should the contrary obtain, no good effects could reasonably be expected to follow.

The human body has been by some philosophers compared to a laboratory, in which are constantly going forward processes of various kinds, dependant on the operation of chemical affinities. The conversion of various kinds of food into blood;

the production of animal heat by the action of the air on that fluid, as it passes through the lungs; and the changes which the blood afterwards undergoes in its course through the body, are all, exclusively, subjects of chemical enquiry.

By Chemistry we learn the changes which diseases effect in the solids and fluids; and by its agency we discover whether any poisonous substance may have been introduced into the system. From the same source we are enabled to apply those remedies which are most likely to decompose or counteract its deleterious effects; and in those unfortunate cases where death has taken place, before relief could be procured, we are enabled to analyze and demonstrate the nature and composition of the poison, and frequently thereby afford evidence against the guilty. By Chemistry we are made acquainted with the component parts of minerals, vegetables, and animals.

And as the sophistication of medicines and the adulteration of flour and bread have in our day become but too frequent, we look to Chemistry alone, to guide and direct us in bringing to light such detestable frauds. Lastly, the chemical analysis of mineral waters is of importance, as determining the principles in which their active powers reside, and thus enabling the physician to employ them with more advantage and discrimination.

We now proceed to treat of the medical effects of the sulphureted water ; and by those who have drank this water, the following lines from the immortal Thomson will be acknowledged as peculiarly applicable.

“ Cool, through the nerves, your pleasing comfort
glides ;

The heart beats glad ; the fresh expanded eye

And ear resume their watch ; the sinews knit ;

And life shoots swift through all the lightened limbs.”

It is customary at Gilsland for the visitors to rise early, and drink this water at the fountain-head, in order that the sulphureted hydrogen and carbonic acid gases may have their full effect. This plan of early rising, and taking exercise before breakfast, contributes much to strengthen the system, and should never be dispensed with, except the weather be severe.

In general, a half-pint tumbler of this water is a sufficient dose for an adult; but the quantity ought to be augmented as the stomach becomes accustomed to it, and may be increased, if needful, to the extent of two or three quarts in the forenoon, always observing to keep the bowels open during a course of this water. For this purpose, from half an ounce to an ounce of Epsom or Rochelle salts may be taken at bed-time, dissolved in mint-water, barley-water, or spring-water.

The sulphureted water acts powerfully upon the kidneys, and as a diuretic, stands unrivalled amongst mineral waters. Its diaphoretic effects are of no ordinary nature, as the writer has witnessed in severe and obstinate diseases of the skin.

As this treatise may frequently be read by persons who are not of the profession, the writer will select a few diseases, for the cure of which this mineral water is most celebrated; and their symptoms shall be described in such a manner, as to render it useful to the general reader.

Dyspepsia, or Indigestion, as it arises from so many causes, is consequently one of the most frequent in the catalogue of diseases. It may be readily discovered by the following symptoms: pain in the region of the stomach, sickness, which is sometimes accompanied by vomiting, languor, sudden and transient distentions of the stomach, eructations, heart-burn.

and want of appetite. These symptoms are most commonly attended with costiveness, and there are generally no affections of any other part of the body. In this disease the food taken into the stomach, which ought to be digested so as to form materials for good chyle, becomes acid or putrid. Most of these symptoms originate from atony or weakness of the muscular fibres of the stomach. Acidity may be obviated by a tea-spoonful or two of Henry's calcined magnesia in a wine glass of distilled mint-water; and when crudities occur, a gentle emetic should be taken. As an adjuvant, warm stimulant laxatives are recommended, such as two or three compound aloetic pills, or three or four compound rhubarb pills at bedtime.

Those invalids who are in a weakened state should use moderate equitation; but if the strength be unimpaired, walking will be found a preferable exercise.

It is not easy to define the quantity of water which should be drank by persons affected with Dyspepsia ; perhaps a quart in the course of the forenoon may suffice, and after the first week, double that quantity may be used. Anxiety and uneasiness of the mind being often remote causes of this disease, the agreeable society and correct habits of the visitors at Gilsland are therefore of considerable value. The diet should be easy of digestion. Vegetables and salted provisions of every description should be avoided. The common drink at meals may be mild porter, or old rum and water.

In Hypochondriasis, or Low spirits, it is sufficient for our present purpose to say, that the same plan may be adopted ; but in this disease smaller doses of the water will be requisite.

In Scrofula and its concomitants this water has been found a most valuable

remedy. It is difficult to give a clear account of this disease to the general reader, but a few symptoms may be mentioned.

Children of scrofulous habits are often affected with tumours upon the neck, which sometimes break, and afterwards heal with difficulty; the upper lip is in some cases swelled; the eyes are inflamed; the skin is remarkably soft and delicate; the cheeks are usually very florid. All these symptoms indicate great debility. The sulphureted water is acknowledged to possess considerable powers as a deobstruent as well as a tonic, and of course has been highly esteemed as a remedy in this disease. It is impossible to lay down any specific rules as to the doses of this mineral water for young persons affected with Scrofula. For the cure of ill-conditioned and irritable ulcers this water is often used, with great benefit, as an external application.

If Consumption of the lungs be not identical with Scrofula, one thing, at least, is sufficiently evident, namely, that there is a great affinity between these two diseases, and that the latter very frequently precedes the former.

In Hectic fever, whether from scrofula, consumption, chlorosis, or diseased viscera, this water will be found a very valuable remedy, particularly if it be used as a cold bath at the same time. A course of the sulphureted water, and a few tepid baths, effected several cures of chronic Rheumatism, under the direction of the writer.

This water is a valuable remedy in atonic Gout, which being a distressing and obstinate disease, requires the greatest attention and reflection. It is known by the various forms of debility and irregular action in gouty habits, by giddiness, headach, fainting, melancholy, wandering,

delirium, and palsy. The following distich is appropriate :

Ut Venus enervat vires, sic copia Bacchi
Enervat vires, debilitatque pedes.

In those diseases which are attended by a copious secretion of bile, this water cannot be too much extolled ; and in some instances in which the waters of Cheltenham failed, this water effected a cure.

In worn out constitutions, which may be recognised by swelled legs, a pale countenance, general debility, and irritability, this water has done wonders ; for, as a diuretic, it removes the first-mentioned symptom, whilst its tonic powers are called into action in strengthening the system.

From the diuretic properties of this water, it has sometimes proved remedial in dropsy, under the eye of a professional attendant. In this case, should laxatives

be indicated, the supertartrate of potash, to the extent of two, three, or four drachms, may be taken each night at bedtime.

Sulphureted waters when placed in contact with an oxyde of lead, (as observed in a former part of this treatise,) causes it to reapproach the metallic state. It is therefore reasonable to infer, that the use of this water, both externally and internally, in colic, from lead, will be serviceable; but this, on the part of the writer, is theoretical, for he has had no experience of its efficacy in this disease. One circumstance stands upon record, which is, that this sulphureted water has long been esteemed as a preventive for colic by those who had been afflicted with this complaint. And it is known to some individuals, that this water was some years ago sent in considerable quantities to persons in this town (Sunderland) to be used as a *preventive* for this disease.

In Calcalous complaints this water has often been used with the best effect. Pure calcined magnesia should be employed during the course.

In Herpetic eruptions, and other diseases of the skin, this water will be found very efficacious ; but as the medical treatment of diseases of the skin requires much talent, experience, and discrimination, it is certainly the most advisable plan for patients afflicted with such diseases, to take the advice of their medical friend, before they commence a course of this mineral water. In all instances when this water is employed for diseases of the skin, frequent and regular exercise ought to be taken, in any manner most suitable to the patient's disposition or convenience. By this plan the diaphoretic effects will be increased, and the determination to the surface will carry off the disease.

The writer observed, that some of the country people heated the sulphureted water before they drank it. This is very erroneous, for, by the process of boiling, the sulphureted hydrogene gas and carbonic acid gas are driven off, and their medical virtues dissipated.

The Chalybeate next demands our attention. When treating of the physical qualities of the sulphureted water, the method of employing it as a sympathetic ink was stated. The chalybeate may also be used as a sympathetic ink in the following manner. Write characters upon paper with a solution of the triple prussiate of potash, and immerse the paper into the chalybeate, which will render the letters prussian blue. This experiment may be reversed, by writing with the chalybeate and rendering the characters legible by the prussiate of potash.

Another sympathetic ink may be formed in the following manner. Use an infusion of galls, and immerse the paper in the chalybeate, which will render the characters black. This experiment may be reversed like the preceding one.

The iron suspended in this water is in the state of a sulphate, which is uncommon. The dose should be half a wine-glass at first, twice a day, which may be increased to a small tumbler. Perhaps the best plan would be, to commence the use of it by putting a tablespoonful of the chalybeate into a common sized tumbler and taking it to the sulphureted water, with which it may be filled, and immediately afterwards drank. The sulphureted hydrogen and carbonic acid gases of the sulphureted water will cause the chalybeate to sit more lightly upon the stomach ; and by this process the dose may also be more readily augmented.

The sulphate of iron, which is the most valuable ingredient in this water, gives so strong an impression upon the tongue, that the twentieth part of a grain of it in a pint tumbler of warm water may be readily distinguished.

In order to prevent any alarm that the circumstance might occasion, it is needful to remark, that when this water is used the fæces become almost black.

Iron, in its different chemical combinations, is one of the most useful substances in the *Materia Medica*. The celebrated Boerhaave was of opinion, with which the writer fully coincides, that it is more nearly allied to the human fluids than any other metal, and that it is almost wholly soluble in them.

This mineral water, (which may be kept for any length of time, provided the bottles be well corked,) has not yet been much

resorted to, except in Dyspepsia, in Amenorrhœa, and as an external application in foul ulcers, for which, from its stimulant and astringent properties, it is likely to be very serviceable.

In Dyspepsia it may be used with the sulphureted water, as recommended above, for eight or ten days, and after this time it may be drank by itself. It will be found a valuable remedy for Amenorrhœa. Professor Gregory, in his *Conspectus Medicinæ theoreticæ*, bears testimony to the efficacy of such chalybeates in this disease, in the following words. “*Ferrum variis modis præparatum, et aquæ medicinales ferratæ, quorum vires roborantes certe haud exiguæ sunt, in eliciendis mensibus insigniter sæpe prosunt.*”

As a tonic, this water will be found very serviceable. Under its use the stomach and chylopoetic viscera will be strengthened, the vascular system excited, the

secretions promoted, and consequently the muscular power increased. Its virtues, therefore, are unquestionable in diseases of debility, in excessive discharges, (provided they be not attended with fever,) local pain, and irritation, or affections of the lungs and head.

Reasoning from analogy, this chalybeate, it is expected, will be found to act as a powerful remedy for leucorrhoea, menorrhagia, and various descriptions of chronic debility.

This mineral water is a well-known and valuable application for spongy gums, and if employed as a *douche* will render essential service in chronic rheumatism, ankylosis, contractions, indolent tumours, debilitated joints, in tinea capitis, and in some herpetic affections.

Few places are so bountifully gifted by nature as Gilsland. It has a Sulphureted

water ; a Chalybeate, holding in solution sulphate of iron ; a Chalybeate, in which the iron is suspended by carbonic acid, and at a little distance an aluminous Chalybeate ; all of which may be employed either externally or internally in a diversity of diseases.

With these united advantages, which few other watering places can boast of, the writer has no hesitation in giving it as his decided opinion, that Gilsland will every year become higher in the public estimation.

Having now, after an unavoidable delay, brought this treatise to a conclusion, the writer, upon reflection, considers it his duty to lay before the reader *Dr. Garnett's account of the Sulphureted water*, and likewise of the *simple Chalybeate*, and *aluminous Chalybeate*, which are mentioned above.

The following are the words, verbatim, of that eminent philosopher.

“1. Characters written on paper with acetate of lead were soon rendered visible by being immersed in the water, or even suspended over it; the colour was at first brown and afterwards black.”

“2. A solution of acetate of lead produced a copious brown precipitate, which afterwards changed to black.”

“3. Nitrate of silver produced a light brown precipitate, which afterwards changed to black.”

“4. Muriate of barytes produced no effects.”

“5. No change was produced by acid of sugar.”

“6. Tincture of galls produced no alteration.”

“7. After the water had been boiled for

about ten minutes, acetate of lead and nitrate of silver produced a white precipitate, but muriate of barytes and acid of sugar no effect."

"From these experiments it is evident, that this water is impregnated with sulphurated hydrogen gas, that it neither contains sulphuric acid, lime, nor iron; but that it probably contains some muriate, as would appear by the effects produced by the nitrate of silver: accordingly, on evaporating slowly a wine gallon of this water, four grains of saline matter, which was chiefly muriate of soda or common salt, were found."

"Twenty-five cubic inches of gaseous fluids were expelled from a wine gallon of the water, of which seventeen were sulphureted hydrogen gas, four azotic gas, and four carbonic acid gas."

"There is a fine chalybeate near the

Shaws, which deserves more attention than has hitherto been paid to it. It is situated at the common, at the distance of not more than two hundred yards from the house, in a boggy or mossy soil ; the road to it is very bad, but might easily be made better."

" The water sparkles a little when poured out of one glass into another, has a strong inky taste, and deposits a copious yellow sediment."

" The following experiments were made with this water :

" 1. Tincture of galls produced a beautiful dark purple colour."

" 2. Muriate of barytes caused no change,"

" 3. Acid of sugar produced no effect."

“ 4. Acetate of lead caused a white cloud.”

“ 5. Nitrate of silver the same.”

“ When boiled, it deposited a yellow sediment, and tincture of galls then produced no effect : but acetate of lead, and nitrate of silver caused the same changes as before.”

“ From these experiments it is evident, that this water contains iron held in solution by a volatile acid, which is undoubtedly the carbonic, of which it contains about thirteen or fourteen cubic inches, and about five or six inches of azotic gas, for the experiment was not made with great nicety. It appears, likewise, that it contains the muriatic acid combined with some base ; and on evaporating a wine gallon, I found it contained two grains and a half of iron, and about three of common salt or muriate of soda.”

“ So that it very much resembles the Chalybeates at Moffat and Harrowgate.”

“ There is another spring, about four miles distant from Gilsland, the water of which is transparent, but of the colour of brandy. It has a strong ferruginous, styp-tic taste, much stronger than ink.”

“ Tincture of galls produced a precipitate, which very much resembled prussian blue, but a little darker. Muriate of barytes caused a copious precipitate. Acid of sugar, and nitrate of silver produced no change; acetate of lead caused a thick, white sediment. From these experiments, and the evaporation of some of the water, it appears a saturated solution of sulphate of iron and sulphate of alumine. It is much too strong and unpleasant for internal use, but it has been employed externally to wash old ulcers with very great effect.”

FINIS.

